

We claim:

## CLAIMS

- 1 1. An apparatus comprising:  
2 a parser to receive a packet and to generate a packet search request;  
3 a plurality of search resources, each search resource to determine a search response to the  
4 packet search request; and  
5 a switch to receive the packet search request from the parser and to multicast the packet  
6 search request to the plurality of search resources.
- 1 2. The apparatus of claim 1, wherein the switch is further configured to receive a search  
response from each of the plurality of search resources, to select one search response from the  
received search responses, and to transmit the selected response to the parser.
- 1 3. The apparatus of claim 2, wherein the parser is further configured to generate a  
modification request for the packet based on the search response.
- 1 4. The apparatus of claim 3, further comprising a plurality of packet modifiers, each packet  
modifier configured to modify the packet using the modification request.
- 1 5. The apparatus of claim 4, wherein the switch is configured to transmit the modification  
2 request from the parser to a packet modifier having a shortest queue.
- 1 6. The apparatus of claim 5, wherein the switch is further configured to transmit the  
2 modified packet from the packet modifier to the parser.
- 1 7. An apparatus comprising:  
2 a parser to receive a packet and to generate a packet request;

3 a plurality of packet resources, each packet resource to generate a packet response based  
4 on the packet request; and  
5 a switch to receive the packet request from the parser and to transmit the packet request  
6 to at least one of the plurality of packet resources.

1 8. The apparatus of claim 7, wherein the packet request is selected from the group  
2 consisting of: a packet search request, a packet modification request, and a session identification  
3 request.

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1 9. The apparatus of claim 7, wherein the switch is further configured to receive a packet  
response from at least one of the plurality of packet resources, and to transmit the packet  
response to the parser.

10. The apparatus of claim 9, wherein the packet response is selected from the group  
consisting of: a search response, a packet modification, and a session identifier.

11. The apparatus of claim 9, wherein the packet resource is selected from the group  
consisting of: a packet modifier, a packet search device, and a session device.

1 12. An apparatus comprising:  
2 first means for receiving a packet and for generating a packet request;  
3 second means for generating a packet response based on the packet request; and  
4 third means for receiving the packet request from said first means and for transmitting the  
5 packet request to said second means.

1 13. The apparatus of claim 12, wherein the packet request is selected from the group  
2 consisting of: a packet search request, a packet modification request, and a session identification  
3 request.

1 14. The apparatus of claim 12, wherein said third means further comprises means for  
2 receiving a packet response from said second means, and for transmitting the packet response to  
3 said first means.

1 15. The apparatus of claim 12, wherein the packet response is selected from the group  
consisting of: a search response, a packet modification, and a session identifier.

16. The apparatus of claim 12, wherein said second means is selected from the group  
consisting of: a packet modifier, a packet search device, and a session device.

17. A method comprising:  
receiving a packet at a parser;  
generating a packet request at the parser; and  
4 using a switch to transmit the packet request from the parser to a packet resource.

1 18. The method of claim 17 further comprising:  
2 using the packet resource to generate a packet response based on the packet request.

1 19. The method of claim 17, wherein the packet request is selected from the group consisting  
2 of: a packet search request, a packet modification request, and a session identification request.

1 20. The method of claim 17 further comprising using the switch to transmit the packet  
2 response from the packet resource to the parser.

21. The method of claim 17, wherein the packet response is selected from the group consisting of: a search response, a packet modification, and a session identifier.

22. The method of claim 17, wherein the packet resource is selected from the group consisting of: a packet modifier, a packet search device, and a session device.

23. A method for state based packet processing comprising:  
allocating session/state storage when session processing is started;  
creating a session lock queue to control the order in which packets are processed;  
executing lock and unlock instructions to access semaphores stored in the session state storage to suspend and restart processing of packets;  
executing an instruction for processing of packets selected from the group consisting of: lock queue create, packet insert, packet delete, queue flush, and queue destroy; and  
de-allocating session/state storage when session processing is completed.